National Institute of Environmental Health Sciences

Extreme winter temperature and birth defects: a population-based case-control study

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Abstract:

BACKGROUND/OBJECTIVE: We examined the relationship between extreme winter temperatures and birth defects to determine whether pregnant women might be vulnerable to the weather extremes expected with climate change. METHODS: In this population-based, case-control study, we linked the New York State Congenital Malformations Registry to birth certificates (1992-2006). Cases were defined as live births with birth defects, and controls were selected from a 10% random sample of live births. We assigned meteorological data based on maternal birth residence and summarized universal apparent temperature across gestational weeks 3-8 (embryogenesis). We defined an extreme cold day as a day with mean temperature below the 10th percentile of the regional winter temperature distribution and a cold spell as 3 consecutive extreme cold days. We averaged temperature for each week of the first trimester to identify susceptible periods. We estimated adjusted odds ratios (ORs) and 95% confidence intervals (CIs) with multivariable logistic regression for 30 birth defects groups. RESULTS: Among 13,044 cases and 59,884 controls with at least 1 week of embryogenesis in winter, coarctation of the aorta was associated with a 1 degrees C decrease in mean universal apparent temperature (OR 1.06, 95% CI 1.02-1.11), cold spell (OR 1.61, 95% CI 1.11-2.34), and number of extreme cold days. We observed reduced odds of hypoplastic left heart syndrome and dislocated hip for some cold indicators. CONCLUSIONS: Most birth defects were not associated with cold indicators; however, we found positive associations between cold indicators and coarctation of the aorta in the biologically-relevant developmental window which warrants replication.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Meteorological Factors, Temperature, Other Exposure

Air Pollution: Ozone

Temperature: Extreme Cold

Other Exposure: apparent temperature; dew point

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Developmental Effect

Developmental Effect: Reproductive

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children, Pregnant Women

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified